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CLAIMS

- A method for producing a therapeutic effect, comprising:

 administering to a pulmonary tissue of a subject an unformulated dry

 polysaccharide particle in an effective amount for producing a therapeutic effect,
 wherein the unformulated dry polysaccharide particle has a mean geometric diameter of

 1-500 microns.
 - 2. The method of claim 1, wherein the polysaccharide is a glycosaminoglycan.
 - 3. The method of claim 2, wherein the glycosaminoglycan is a heparin.
 - 4. The method of claim 2, wherein the glycosaminoglycan is a heparin sulfate.
 - 5. The method of claim 2, wherein the glycosaminoglycan is a low molecular weight heparin.
 - 6. The method of claim 3, wherein the heparin is a biotechnology derived heparin.
 - 7. The method of claim 3, wherein the heparin is a chemically modified heparin.
 - 8. The method of claim 2, wherein the glycosaminoglycan is a heparin analogue.
- 9. The method of claim 8, wherein the heparin analogue is selected from the group consisting of an oligosaccharide and an AT-III binding pentasaccharide.
 - 10. The method of claim 2, wherein the glycosaminoglycan is an unfractionated heparin preparation.
 - 11. The method of claim 1, wherein the unformulated dry polysaccharide particle has a mean geometric diameter of 1-200 microns.

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- 12. The method of claim 1, wherein the unformulated dry polysaccharide particle has a mean geometric diameter of 1-53 microns.
- 13. The method of claim 1, wherein the unformulated dry polysaccharide particle has a mean geometric diameter of 53-106 microns.
 - 14. The method of claim 1, wherein the unformulated dry polysaccharide particle has a mean geometric diameter of 1-5 microns.
 - 15. The method of claim 1, wherein the unformulated dry polysaccharide particle has a mean aerodynamic diameter of 1-5 microns.
- 16. The method of claim 1, wherein the unformulated dry polysaccharide particle has a mean aerodynamic diameter selected from the group consisting of 5-35 and 35-75 microns.
 - 17. The method of claim 2, wherein the subject has or is at risk of a coagulation disorder and the therapeutic effect of the glycosaminoglycan is anti-coagulation or antithrombosis.
 - 18. The method of claim-17, wherein the coagulation disorder is selected from the group consisting of thrombosis associated with cardiovascular disease and vascular conditions.
 - 19. The method of claim 18, wherein the cardiovascular disease is selected from the group consisting of acute myocardial infarction, unstable angina, and atrial fibrillation.
- 30 20. The method of claim 18, wherein the vascular condition is selected from the group consisting of deep venous thrombosis, stroke, and pulmonary embolism.

- 21. The method of claim 17, wherein the glycosaminoglycan is administered in an amount effective to produce a minimum therapeutic level of approximately 0.2 IU/ml anti-factor Xa activity.
- 5 22. The method of claim 2 wherein the subject is preparing to undergo, is undergoing or is recovering from a surgical procedure.
 - 23. The method of claim 22, wherein the surgical procedure is selected from the group consisting of cardiac-pulmonary by-pass surgery, coronary revascularization surgery, orthopedic surgery, and prosthesis replacement surgery.
 - 24. The method of claim 2, wherein the subject has or is at risk of atherosclerosis.
- 25. The method of claim 2, wherein the subject has or is at risk of a respiratory disorder.
 - 26. The method of claim 25, wherein the respiratory disorder is selected from the group consisting of asthma, emphysema, adult respiratory distress syndrome (ARDS), and lung reperfusion injury.
 - 27. The method of claim 2, wherein the subject has or is at risk of developing a cancer or metastasis.
- 28. The method of claim 2, wherein the subject has or is at risk of developing an inflammatory disorder.
 - 29. The method of claim 2, wherein the subject has or is at risk of developing an allergy.

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- 30. The method of claim 2, wherein the subject has or is at risk of developing an angiogenic disorder and the glycosaminoglycan is administered in an effective amount for preventing angiogenesis.
- 31. The method of claim 2, wherein the angiogenic disorder is selected from the group consisting of neovascular disorders of the eye, osteoporosis, psoriasis, and arthritis.
- 32. The method of claim-1, wherein the polysaccharide is selected from the group consisting of chondroitin sulfate, dermatan sulfate, hyaluronic acid, Pectin, pectin derivatives, oligosaccharides and pentasaccharides that bind to AT-III.
 - 33. The method of claim 1, wherein the unformulated dry polysaccharide is self administered by the subject.
 - 34. The method of claim 1, wherein the unformulated dry polysaccharide is administered through a tracheal tube.
 - 35. The method of claim 2, wherein the subject is undergoing a tissue or organ transplant.
 - 36. The method of claim 1, wherein the unformulated dry polysaccharide has a tap density of 0.01 0.4 g/cm³.
 - 37. The method of claim 1, wherein the unformulated dry polysaccharide has a tap density of greater than 0.4 g/cm³.
 - 38. A method for delivering at least 5% of a polysaccharide to lower respiratory tract, comprising:
 - administering to a pulmonary tissue of a subject an unformulated dry polysaccharide particle, wherein the unformulated dry polysaccharide particle has a

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mean geometric diameter of 1-500 microns, and wherein at least 5% of the polysaccharide administered is delivered to the lower respiratory tract.

- 39. The method of claim 38, wherein at least 10% of the polysaccharide administered is delivered to the lower respiratory tract.
 - 40. The method of claim 38, wherein at least 30% of the polysaccharide administered is delivered to the lower respiratory tract.
- 10 41. The method of claim 38, wherein at least 50% of the polysaccharide administered is delivered to the lower respiratory tract.
 - 42. A method for systemically delivering a polysaccharide to a subject, comprising:

administering to a pulmonary tissue of the subject an unformulated dry polysaccharide particle, wherein the unformulated dry polysaccharide particle has a mean geometric diameter of 1-500 microns.

- 43. A composition consisting of unformulated dry glycosaminoglycan having a mean geometric diameter of 1-500 microns.
- 44. The composition of claim 43, wherein the unformulated dry glycosaminoglycan has a mean geometric diameter of 1-200 microns.
- 45. The composition of claim 43, wherein the unformulated dry glycosaminoglycan has a mean geometric diameter of 1-53 microns.
- 46. The composition of claim 43, wherein the unformulated dry glycosaminoglycan has a mean geometric diameter of 1-5 microns.
- 47. The composition of claim 43, wherein the unformulated dry glycosaminoglycan has a mean geometric diameter of 5-53 microns.

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- 48. The composition of claim 43, wherein the unformulated dry glycosaminoglycan has a mean geometric diameter of 53-106 microns.
- 49. The composition of claim 43, wherein the glycosaminoglycan is selected from the group consisting of a heparin, a heparin sulfate, a low molecular weight heparin, a biotechnology derived heparin, a chemically modified heparin, a heparin analogue, and an unfractionated heparin preparation.
- 50. The composition of claim 43, further comprising a formulated dry glycosaminoglycan preparation.
 - 51. The composition of claim 50, wherein the glycosaminoglycan of the formulated dry glycosaminoglycan preparation is selected from the group consisting of a heparin, a heparin sulfate, a low molecular weight heparin, a biotechnology derived heparin, a chemically modified heparin, a heparin analogue, and an unfractionated heparin preparation.
 - 52. The composition of claim 50, wherein the glycosaminoglycan of the formulated dry glycosaminoglycan preparation is the same as the glycosaminoglycan of the unformulated dry glycosaminoglycan preparation.
 - 53. The composition of claim 50, wherein the glycosaminoglycan of the formulated dry glycosaminoglycan preparation is different than the glycosaminoglycan of the unformulated dry glycosaminoglycan preparation.
 - 54. The composition of claim 50, wherein the formulated dry glycosaminoglycan preparation includes a polymer to effect slow release of the glycosaminoglycan.
 - 55. The composition of claim 54, wherein the polymer is selected from the group consisting of PLA, PGA, and PLGA.

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- 56. The composition of claim 50, wherein the formulated dry glycosaminoglycan preparation includes a surfactant.
 - 57. The composition of claim 56, wherein the surfactant is DPPC.

58. A method for delivering a glycosaminoglycan to a subject, comprising, administering to a pulmonary tissue of a subject the composition of any one of claims 43-57.

59. A method of rapidly delivering a polysaccharide to a subject comprising: administering a dry aerosol containing a polysaccharide to a pulmonary tissue of a subject in an effective amount to produce a peak plasma concentration of polysaccharide within two hours.

- 60. The method of claim 59, wherein dry aerosol containing a polysaccharide is administered in an effective amount to produce the peak concentration or activity of polysaccharide within one and one half hours.
- 61. The method of claim 59, wherein dry aerosol containing a polysaccharide is administered in an effective amount to produce the peak concentration or activity of polysaccharide within one hour.
 - 62. The method of claim 59, wherein dry aerosol containing a polysaccharide is administered in an effective amount to produce the peak concentration or activity of polysaccharide within one half hour.
 - 63. The method of claim 59, wherein the polysaccharide is a glycosaminoglycan.
- 64. The method of claim 63, wherein the glycosaminoglycan is selected from the group consisting of a low-molecular-weight heparin, heparin, heparin sulfate, biotechnology derived heparin, chemically modified heparin, heparin analogue, and unfractionated heparin preparation.

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- 65. The method of claim 59, wherein the dry aerosol contains an unformulated dry polysaccharide.
- 5 66. The method of claim 59, wherein the dry aerosol contains a dry polysaccharide formulated in a surfactant.
 - 67. The method of claim 66, wherein the surfactant is DPPC.
- 10 68. The method of claim 66, wherein the surfactant is coated on the particle surface.
 - 69. The method of claim 66, wherein the surfactant is incorporated into the formulation.
 - 70. The method of claim 59 further comprising administering an additional therapeutic agent.
 - 71. The method of claim 70, wherein the additional therapeutic agent is selected from the group consisting of proteins, peptides, nucleic acids, and small organic molecules.
 - 72. The method of claim 59, wherein the dry aerosol containing a polysaccharide includes both a formulated and an unformulated dry polysaccharide.
 - 73. A method of rapidly delivering a polysaccharide to a subject comprising: administering a dry aerosol containing a polysaccharide to a pulmonary tissue of a subject in an effective amount to deliver at least 5% of the polysaccharide to the blood within one hour.
 - 74. A method of claim 73, wherein at least 10% of the polysaccharide is delivered to the blood within one hour.

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- 75. The method of claim 73, wherein at least 20% of the polysaccharide is delivered to the blood within one hour.
- 76. The method of claim 73, wherein at least 40% of the polysaccharide is delivered to the blood within one hour.
 - 77. The method of claim 73, wherein at least 50% of the polysaccharide is delivered to the blood within one hour.
 - 78. A method of claim 73, wherein at least 10% of the polysaccharide is detectable in the blood within one hour.
 - 79. A method for producing a rapid therapeutic effect, comprising: administering a dry aerosol containing a polysaccharide to a pulmonary tissue of a subject in an effective amount for producing a therapeutic effect within 1 hour of administration.
 - 80. The method of 79, wherein the dry aerosol is administered in an effective amount for producing a therapeutic effect within 15 minutes of administration.
 - 81. The method of 79, wherein the dry aerosol is administered in an effective amount for producing a therapeutic effect within 10 minutes of administration.
- 82. A composition comprising a dry aerosol formulation of particles containing a heparin-like glycosaminoglycan, wherein the particles have a mean geometric diameter of greater than 30 microns.
 - 83. The composition of claim 82, wherein the particles are spherical.
 - 84. The composition of claim 82 wherein the particles are non-spherical.

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- 85. The composition of claim 82, wherein the particles are porous.
- 86. The composition of claim 82, wherein the particles are non-porous.
- 87. The composition of claim 82, further comprising a surfactant.
- 88. The composition of claim 82, further comprising a polymer to effect slow release of the heparin-like glycosaminoglycan.
- 89. A composition comprising a dry aerosol formulation of particles containing a heparin-like glycosaminoglycan, wherein the particles have a mean aerodynamic diameter of greater than 5 microns.
- 90. A composition comprising a dry aerosol formulation of particles containing a heparin-like glycosaminoglycan, wherein the particles have a tap density of greater than 0.4 g/cm³.
- 91. A kit for administering a dry aerosol containing a polysaccharide to the respiratory tract of a subject comprising:

an inhalation apparatus,

polysaccharide dry aerosol particle formulation, wherein the polysaccharide dry aerosol particle is formulated to release at least 5% of the polysaccharide within 2 hours and

a detection system.

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- 92. The kit of claim 91, wherein the polysaccharide is a glycosaminoglycan.
- 93. The kit of claim 92, wherein the flycosaminoglycan is selected from the group consisting of a low-molecular-weight heparin, heparin, heparin sulfate, biotechnology derived heparin, chemically modified heparin, heparin analogue and unfractionated heparin preparation.

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- 94. The kit of claim 91, wherein the mean geometric diameter of the particles is between 1 and 500 μm .
- 95. The kit of claim 91, wherein the mean geometric diameter of the particles is between 1 and 106 μm.
 - 96. The kit of claim 91, wherein the mean geometric diameter of the particles is between 5 and 53 μm .
- 97. The kit of claim 91, wherein the aerodynamic diameter of the particles is between 1 and 5 μm.
 - 98. The kit of claim 91, wherein the aerodynamic diameter of the particles is selected from the group consisting of 3-35 and 35-75 microns..
 - 99. A method for delivering a polysaccharide to a subject, comprising: administering to a pulmonary tissue of the subject a dry aerosol formulation comprising an unformulated dry glycosaminoglycan preparation and a formulated dry glycosaminoglycan preparation to deliver the polysaccharide to the subject.
 - 100. The method of claim 99, wherein the ratio of unformulated preparation to formulated preparation is 90:10.
 - 101. The method of claim 99, wherein the ratio of unformulated preparation to formulated preparation is 70:30/
 - 102. The method of claim 99, wherein the ratio of unformulated preparation to formulated preparation is 50:50.
 - 103. The method of claim 99, wherein the ratio of unformulated preparation to formulated preparation is 30:70.

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- 104. The method of claim 99, wherein the ratio of unformulated preparation to formulated preparation is 10:90.
- 105. The method of claim 99, wherein the polysaccharide is a
 glycosaminoglycan and the glycosaminoglycan is selected from the group consisting of a
 heparin, a heparin sulfate, a low molecular weight heparin, a biotechnology derived
 heparin, a chemically modified heparin, a heparin analogue, and an unfractionated
 heparin preparation.
 - 106. The method of claim 105, wherein the glycosaminoglycan of the formulated dry glycosaminoglycan preparation is the same as the glycosaminoglycan of the unformulated dry glycosaminoglycan preparation.
 - 107. The method of claim 105, wherein the glycosaminoglycan of the formulated dry glycosaminoglycan preparation is different than the glycosaminoglycan of the unformulated dry glycosaminoglycan preparation.
 - 108. The method of claim 99, wherein the formulated dry glycosaminoglycan preparation includes a polymer to effect slow release of the glycosaminoglycan.
 - 109. The method of claim 108, wherein the polymer is selected from the group consisting of PLA, PGA, and PLGA.
- 110. The method of claim 99, wherein the formulated dry glycosaminoglycan preparation includes a surfactant.
 - 111. The method of claim 110, wherein the surfactant is DPPC.
- 112 The method of claim 99, wherein the relative ratio of formulated to
 unformulated preparation is selected from the group consisting of 10:90, 20:80, 30:70,
 40:60, 30:50, 60:40, 70:30, 80:20, and 90:10.